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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/596,467

06/14/2006

Thomas Netsch

PHDE030426US

6961

38107

7590

02/02/2011

PHILIPS INTELLECTUAL PROPERTY & STANDARDS

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EXAMINER

LI, RUIPING

ART UNIT

PAPER NUMBER

2624

MAIL DATE

DELIVERY MODE

02/02/2011

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/596,467	Applicant(s) NETSCH ET AL.	
	Examiner RUIPING LI	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,6-9 and 12-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4, 6-9 and 12-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This is in response to the applicant response filed on 12/28/2010. In the applicant's response, claims 1, 4, 5-9 were amended; claims 2-3 and 1-11 were cancelled; claims 12-23 were newly added. Accordingly, claims 1, 4, 5-9, and 12-23 are pending and being examined.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for **failing to particularly point out and distinctly claim** the subject matter which applicant regards as the invention.

As to claim 12, the claim recites: "a method of generating a two-dimensional representation on a display plane of three-dimensional anatomical features of interest of the anatomical object" in lines 1-3. However, there is insufficient antecedent basis for "the anatomical object" in the claim. For prior art comparison, "the anatomical object" is read as "a common anatomical object". Further, the claim recites: "using the imaging specification to project the anatomical features of interest of the morphological and functional diagnostic image records onto the image plane to generate the two-

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dimensional representation of the anatomical features of interest” in lines 16-19.

However, it is not clear what “the image plane” refers to, and thus there is insufficient basis for “the image plane” in the claim. Finally, the claim recites: “the imaging specification begin defined by the first and second projections” in lines 14-15. However, it is not clear what “the imaging specification begin defined by the first and second projections”.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

A. Claims 1, 4 and 6-9, 12-16 and 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Front et al (**USPGPub 2001/0041835 A1**, hereinafter “Front”) in view of Etienne et al (“**Soap-bubble visualization and quantitative analysis of 3D coronary magnetic resonance angiograms**”, MR in Medicine, 2002, “Etienne”). Etienne is cited by applicant in IDS filed on 06/14/2006.

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As to claims 1, 21, 22, Front discloses a method for the computer-assisted visualization of a three-dimensional anatomical object (**the method for guiding a diagnosis or therapeutic instrument towards a target region inside the patient's body, see [0001]**), comprising the following method steps:

recording two or more diagnostic image data records of the object wherein at least one image data record comprises morphological image information of the anatomical object and at least one further image data record comprising functional image information relating the anatomical object (**registering a high-resolution structural image and a low-resolution functional image of a portion of the patient's body, in order to obtain a combined image, see [0008], [0004] and [0014]**); and

calculating a combined two-dimensional representation by imaging the two or more image data records according to a previously defined imaging specification onto a common display plane (**registering the 2D structural image fig.2B with the 2D functional image fig.2A, and thus obtaining a combined image fig.2C, those images are displayed by a 2D image plane in a video terminal, see fig.2A-2C, [0027], [0049], and [0051]**).

Front does not expressively disclose delimiting an object volume which includes the anatomical features of interest of the anatomical object with a curved surface and projecting the anatomical features of interest from morphological or functional diagnostic image records onto the curved surface to define an imaging specification. **However**, Etienne does explicitly teach: defining an imaging specification for imaging the image

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data onto a two-dimensional display plane, the definition of the imaging specification involving the identification of anatomical features of the object in at least one of the image data records and the determination of an object volume delimited by a curved surface in which the anatomical features of the object are contained; and calculating a combined two-dimensional representation by imaging the two or more image data records according to the previously defined imaging specification onto a common display plane wherein a projection of the image information of the data records that is contained in the object volume is calculated during the calculation of the two-dimensional representation (**see fig.2 in page 659, para.1 lines 9-14, in the right col. of page 658, and para.1 in the right col of page 659; the plane with normal vector N is a common display plane**).

It would have been obvious to person skilled in the art at the time of the invention to combine the teaching of Front and the teaching of Etienne in order to monitor the real time changes taking place due to a disease and guiding the instrument toward the target region (**Front, [0008] and [0009]**).

As to claims 12, 18, 19, Front discloses a method of generating a two-dimensional representation on a display plane of three-dimensional anatomical features of interest of the anatomical object, the method comprising:
recording a morphological diagnostic image record of the anatomical object and a functional diagnostic image record of the anatomical object (**registering a high-**

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resolution structural image and a low-resolution functional image of a portion of the patient's body, in order to obtain a combined image, see [0008], [0004] and [0014]); and

using the imaging specification (**the tumor portion of the organ image, see fig.2A-2C**) to project the anatomical features of interest of the morphological and functional diagnostic image records onto the image plane to generate the two-dimensional representation of the anatomical features of interest (**registering the 2D structural image fig.2B with the 2D functional image fig.2A, and thus obtaining a combined image fig.2C, those images are displayed by a 2D image plane in a video terminal, see fig.2A-2C, [0027], [0049], and [0051]**).

Front does not explicitly disclose delimiting an object volume which includes the anatomical features of interest of the anatomical object with a curved surface; defining an imaging specification by: a) projecting the anatomical features of interest from one of the morphological or functional diagnostic image records onto the curved surface to determine a first projection, and b) projecting the anatomical features along parallel rays from the curved surface onto the display plane to determine a second projection, the imaging specification begin defined by the first and second projections.

However, Etienne does teach delimiting an object volume which includes the anatomical features of interest of the anatomical object with a curved surface (**specifying a curved subvolume that closely encompassed the interest anatomical segments, see**

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Abstract lines 9-12, and the volume V in fig.2);

defining an imaging specification by: a) projecting the anatomical features of interest from one of the morphological or functional diagnostic image records onto the curved surface to determine a first projection (**identifying points P_i which define the manipulated surface D by projecting the interest points in the volume V on the convex hull D' , see para.1 in the right col. on page 659 lines 6-13 and fig.2),** and b) projecting the anatomical features along parallel rays from the curved surface onto the display plane to determine a second projection (**performing a parallel MIP, see para.1 in the right col. on page 659 lines 13-21 and fig.2),** the imaging specification begin defined by the first and second projections (**thus a 2D resulting image displays a planar reconstruction of the user-selected anatomy, see para.1 in the right col. on page 659 lines 21-23 and fig.2).**

It would have been obvious to person skilled in the art at the time of the invention to combine the teaching of Front and the teaching of Etienne in order to monitor the real time changes taking place due to a disease and guiding the instrument toward the target region (**Front, [0008] and [0009]**).

As to claims 4, 13, the combination of Front and Etienne discloses, wherein in order to calculate the two-dimensional representation, Cartesian coordinates within the display plane are assigned to non-Cartesian surface coordinates of the object volume (**Front, transforming the coordinates of the trajectory in the coordinate system of the combined image into the coordinate system of steretactic guide, see [0052]**). It

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would have been obvious to person skilled in the art to know that the coordinate system of stereotactic guide may be a polar system which is a non-Cartesian system. Moreover, the coordinate system transformation between a polar system and a Cartesian system is well known technique in the art.

As to claim 6, the combination of Front and Etienne discloses the method as claimed in claim 1, wherein the functional image information is obtained by evaluating temporal sequences of morphological image data of the anatomical object **(Front, (1) taking a series of structural images for a target portion of the patient's body with the high-resolution in a certain period of time, (2) taking a functional image for the target portion with low-resolution after injecting a suitable radiopharmaceutical into the patient, and then (3) registering the function image with the structural image and providing the combined image that shows where the cancerous area are located on the high-resolution morphologic image, see [0020] lines 5-26, and [0023]-[0029], which means that the functional image information, i.e., cancerous area, is obtained by evaluating temporal sequences of morphological image data).**

As to claim 7, the combination of Front and Etienne discloses the method as claimed in claim 1, wherein at least one of the image data records comprises at least one slice image of the anatomical object **(Front, taking a series of structural images for a target portion of the patient's body with the high-resolution in a certain period of time, see [0020] lines 5-26).**

As to claim 8, the combination of Front and Etienne discloses the method as claimed in claim 1, wherein the image data records are recorded by means of computer tomography, magnetic resonance or ultrasound (**Front, CT, MRI, SPECT, PET image, see [0003] lines 8-19**).

As to claim 9, the combination of Front and Etienne discloses the method as claimed in claim 1, wherein the image data records are recorded using different imaging modes (**Front, CT, MRI, SPECT, PET image, see [0003] lines 8-19**).

As to claims 14 and 15, the combination of Front and Etienne discloses the method as claimed in claim 13, further including: transforming the anatomical features projected on the curved surface into Cartesian coordinates, the projecting of the anatomical features from the curved surface to the imaging plane being performed in the Cartesian coordinates wherein the non-Cartesian system (**Front, transforming the coordinates of the trajectory in the coordinate system of the combined image into the coordinate system of steretactic guide, see [0052]**). It would have been obvious to person skilled in the art to know that the coordinate system of steretactic guide may be a Cartesian system which is a non-Cartesian system. Moreover, the coordinate system transformation between a polar system and a Cartesian system is well known technique in the art.

As to claim 16, the combination of Front and Etienne discloses the method as claimed in claim 14, wherein the curved surface includes at least a portion of the ellipsoid **(Etienn, identifying points P_i which define the manipulated surface D by projecting the interest points in the volume V on the convex hull D' , see para.1 in the right col. on page 659 lines 6-13 and fig.2; the convex hull D' is a portion of the ellipsoid).**

As to claim 20, the combination of Front and Etienne discloses a system comprising one or more processors which perform the method as claimed in claim 12 to generate the two-dimensional image representation from the morphological and functional diagnostic image records; the system further comprising:
a display unit on which the two dimensional image representation is displayed (**Etienn, see fig.3**).

As to claim 23, the combination of Front and Etienne discloses a system comprising one or more processors which perform the method as claimed in claim 1 to generate the two-dimensional image representation from the morphological and functional diagnostic image records. The systems further comprising:
a display unit on which the two dimensional image representation is displayed (**Etienn, see fig.3**).

B. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Front in view of Etienne and further in view of DU (**USP 6,268,730**).

As to claim 17, the combination of Front and Etienne discloses the method as claimed in claim 12, the combination does not explicitly disclose further including: performing a scout scan with an MR imaging system to identify a location of the anatomical features of interest; based on the scout scan, controlling the MR imaging system to generate the morphological and functional image records. However, **Du** does teach performing a scout scan with an MR imaging system to identify a location of the anatomical features of interest; based on the scout scan, controlling the MR imaging system to generate the morphological and functional image records (**see Fig.5 and col.6 lines 17-23**).

Moreover, performing a prior scan to quickly determine the range of the object is well known technique in the art. It would have been obvious to persons skilled in the art to combine the teaching of Du and teachings of Front and Etienne in order to quickly find the location of the interest object.

Response to Arguments

4. Applicant's arguments, with respects to claim 1, filed on 12/28/2010, have been fully considered but they are not persuasive.

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Applicant submits, on page 7, that there no teaching or motivation to combine Front and Etienne.

Examiner respectfully disagrees with this argument, because:

Front discloses registering high-resolution structural images and low-resolution functional images of anatomical features of the patient's body in order to obtain a combined image which includes the anatomical features of the object (**see [0008], [0004] and [0014]**), and directly displaying/projecting the combined image in a 2D image plane on a video terminal (**see Fig.2A-2C, [0027], [0049], and [0051]**). Front does not expressively disclose delimiting an object volume which includes the anatomical features of the anatomical object by a curved surface and projecting the anatomical features from morphological or functional diagnostic image records onto the 2D curved surface to define an imaging specification. **Etienne** discloses delimiting an object volume which includes the anatomical features of the anatomical object with a curved surface (**see Abstract lines 9-12, and the volume V in fig.2**); and projecting the anatomical features from morphological or functional diagnostic image records onto the 2D curved surface to define an imaging specification (**see para.1 in the right col. on page 659 lines 6-23 and fig.2**).

Front and Etienne are combinable because they are from same field of endeavor in medical image registration and visualization. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to employ the

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technique of delimiting an object volume which includes the anatomical features of the anatomical object by a curved surface and projecting the anatomical features from morphological or functional diagnostic image records onto the curved surface to define an imaging specification, as taught by Etienne and modify Front which directly display the combined image on a 2D image plane without delimiting an object volume which includes the anatomical features of the anatomical object by a curved surface. The suggestion/motivation for doing so would have been to monitor the real time changes taking place due to a disease and guiding the instrument toward the target region (**Front, [0008] and [0009]**). Therefore, it would have been obvious to combine Front with Etienne to obtain the invention as specified in claims 1 and 12.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RUIPING LI whose telephone number is (571)270-3376. The examiner can normally be reached on 8:30am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner, Art Unit 2624

1/14/2011

/Samir A. Ahmed/

Supervisory Patent Examiner, Art Unit 2624